

*LIMNODRILUS TORTILIPENIS*, A NEW  
NORTH AMERICAN SPECIES OF  
FRESHWATER TUBIFICIDAE  
(ANNELIDA: CLITELLATA: OLIGOCHAETA)<sup>1</sup>

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*Abstract.*—*Limnodrilus tortilipenis* n. sp. (Annelida: Oligochaeta: Tubificidae) is described from four specimens collected from the Cache River drainage, southern Illinois. This description brings to 14 the number of species in this genus, ten of which are now known to occur in North America. *Limnodrilus tortilipenis* is distinguished from its congeners by its extremely long penis sheaths and the corkscrewlike distal ends of its penis. A key is presented to distinguish *L. tortilipenis* from other morphologically similar species of *Limnodrilus*.

Members of the family Tubificidae, particularly species in the genus *Limnodrilus*, are common and often overwhelmingly abundant inhabitants of rivers, streams, lakes, and ponds throughout the world, especially in areas receiving organic enrichment. During a faunistic assessment of aquatic Oligochaeta in the Cache River drainage, southern Illinois (Wetzel 1980, 1981), specimens of a previously undescribed *Limnodrilus* were collected. This discovery increases to 14 the number of species in the genus *Limnodrilus*, ten of which are now known to occur in North America.

Materials and Methods

Specimens of this new species were collected 9 Mar 1978 from Dutchman Creek, Johnson County, Illinois. Live worms were fixed immediately in 10% buffered formalin and taken to the laboratory for processing

and identification. Microscopical studies were made of specimens in Hydramount<sup>2</sup> on glass slides.

*Limnodrilus tortilipenis*,  
new species  
Figs. 1-11

*Material examined.*—HOLOTYPE: USNM 100439, Illinois: Johnson County; Dutchman Creek; 2.4 km west of Vienna; 9 Mar 1978; coll. D. A. McCormick & M. J. Wetzel. PARATYPES: USNM 100440. Illinois: Johnson County; Cache River; 1.9 km west of West Vienna; 24 May 1976; coll. M. J. Wetzel; 1 specimen. INHS Annelida Collection, Illinois: Johnson County; Dutchman Creek; 2.4 km southwest of Vienna; 2 May 1978; coll. D. A. McCormick & M. J. Wetzel; 1 specimen. Illinois: Johnson County; Cave Creek; 2.1 km northeast of Forman; 27 Feb 1976; coll. L. R. Richart & M. J. Wetzel; 1 specimen.

*Etymology.*—"tortilus"—Latin, "twisted," refers to the twisted, corkscrewlike distal ends of the cuticular penes.

*Diagnosis.*—This medium-sized *Limnodrilus* is distinguished from all other members of the genus by extremely long and slender penis sheaths with elaborately developed heads. The shaft of each penis tapers

<sup>1</sup> Due to unforeseeable changes in the submission and publication dates of Brinkhurst (1986) and this present manuscript, part of this description unfortunately was published in Brinkhurst 1986 (pp. 168-169) as *Limnodrilus tortilipenis* Wetzel, 1986.

<sup>2</sup> Hydramount, previously available from Biomedical Specialties in Santa Monica, California, was discontinued recently by its manufacturer.

gradually from basal to distal end. Although superficially similar to *L. claparedianus* Ratzel, *L. tortilipenis* is 4 to 7 times as long. The head of each penis resembles a corkscrew, with proximal, fingerlike projections directed basally and medially.

*Description.*—Length: 15 to 22 mm (preserved). Diameter: 0.4 to 0.7 mm (preserved). Number of segments: 28 to 108; one paratype incomplete and one paratype regenerated posteriorly. Prostomium appearing triangular in dorsal view, rounded in lateral view. Width of prostomium at peristomial junction greater than length. Dorsal and ventral chaetae all bifid crotchets, 79 to 113  $\mu\text{m}$  long, 5 to 7  $\mu\text{m}$  diameter. Dorsal chaetae 5 to 10 per bundle anteriorly; 4 to 5 per bundle posteriorly from IX. Ventral chaetae 6 to 8 per bundle anteriorly; 3 to 4 per bundle posteriorly from VII. Anterior chaetae each with distal tooth longer and thinner than proximal tooth (Fig. 1); posterior chaetae each with distal tooth equal to or shorter than proximal tooth (Fig. 2). Some chaetae on types worn.

Penis sac with spiralled muscle bands. Cuticular penis sheaths 2741 to 4080  $\mu\text{m}$  in length, 28.2 to 50.4  $\mu\text{m}$  in basal width, tapering gradually through entire length to narrowest area just posterior to head (8.4 to 9.6  $\mu\text{m}$ ) (Fig. 3). Width at midshaft 14.4 to 20.4  $\mu\text{m}$ . Base of head resembling corkscrew, with fingerlike proximal projections (Figs. 4–9). Bases of penes originate around posterior portion of XVI. Spermatzeugmata 335 to 441  $\mu\text{m}$  in length and 70 to 94  $\mu\text{m}$  in width. Outer layer of spermatzeugmata 4 to 22  $\mu\text{m}$  thick, with axial cavity 13 to 67  $\mu\text{m}$  in diameter (Figs. 10, 11).

Additional diagnostic characters often used in the description of *Limnodrilus*, such as the length and breadth of vas deferens and atrium, were impossible to diagnose accurately because of the macerating nature of the mounting medium. Repeated attempts to collect additional specimens from the type locality and elsewhere for diagnosis from their known localities have been unsuccessful.

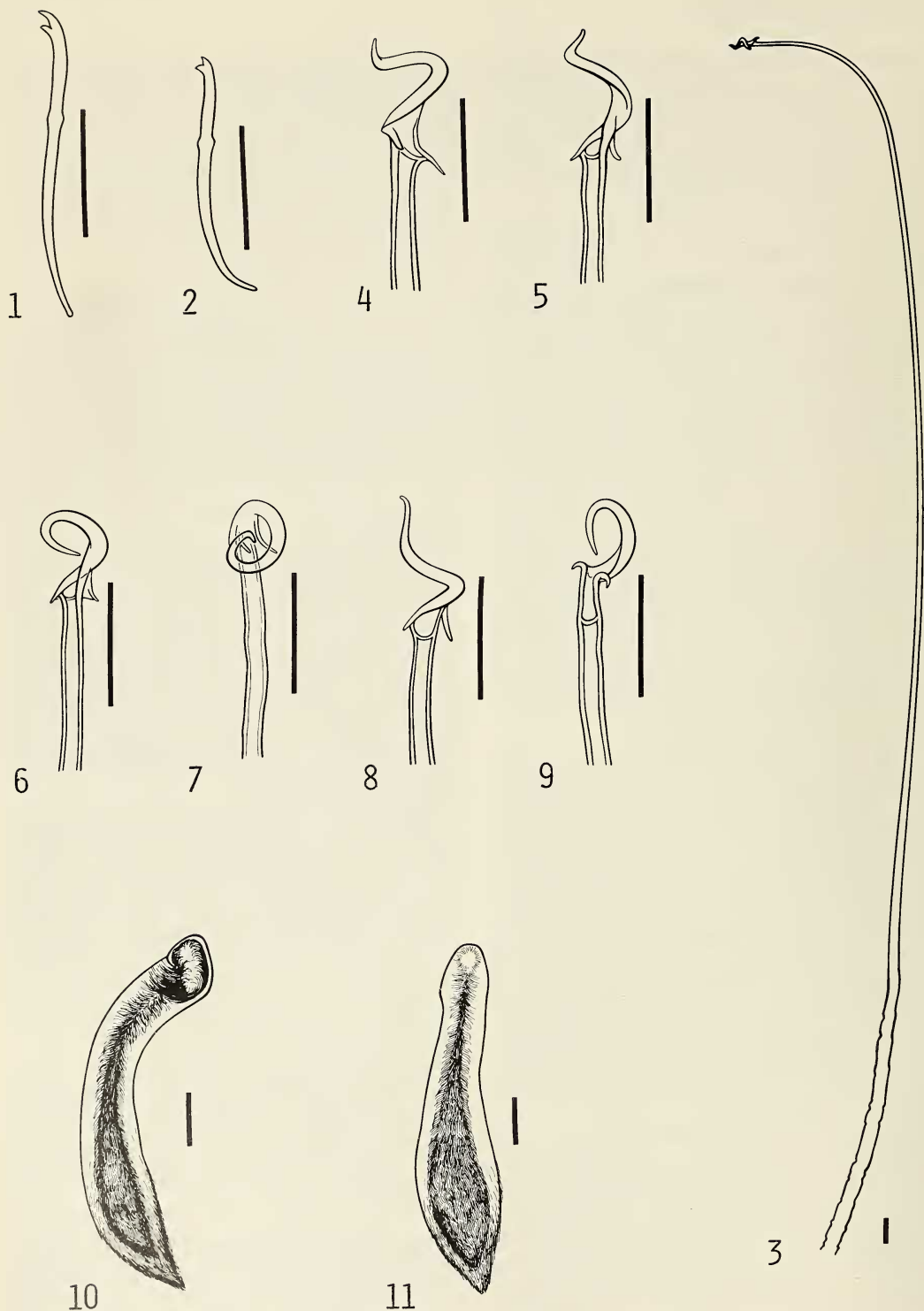
Other congeners of *Limnodrilus tortilipenis* occurring within the Cache River drainage include *L. angustipenis* Brinkhurst & Cook, *L. cervix* Brinkhurst, *L. claparedianus* Ratzel, *L. hoffmeisteri* Claparède, *L. maumeensis* Brinkhurst & Cook, *L. profundicola* (Verrill), *L. rubripenis* Loden, and *L. udekemianus* Claparède.

## Discussion

This species, typical of the genus, is characterized by two dorsal and two ventral bundles of chaetae which are exclusively bifid and three to six in number, hearts in segments VIII and IX, long vasa deferentia, atria with solid prostates, and true penes with chitinous sheaths. The penes are elaborately developed and surrounded by penial sacs with spiral muscles. Genital chaetae, hair chaetae, and pectinate chaetae are absent. Coelomocytes are absent; the spermathecae have spermatzeugmata (Brinkhurst and Jamieson 1971). Considerable intraspecific variation can be observed in the characters used for identification of members in this genus.

The penes of *L. tortilipenis* are morphologically more elaborate than other members of the genus, as illustrated in Brinkhurst (1965); Hiltunen (1967); Kennedy (1969); Brinkhurst and Jamieson (1971); Loden (1977); Stimpson, Klemm, and Hiltunen (1982); and Brinkhurst and Wetzel (1984); the heads of the penes terminate like those of corkscrews (Figs. 4–9).

Stimpson, Klemm, and Hiltunen (1982) provided a guide to freshwater Tubificidae known to occur in North America. Characters used to identify the tubificids in this key included those external and internal structures readily observable in whole-mounted material, using conventional light microscopy. These characters included somatic chaetae and structure of the male reproductive system. *Limnodrilus tortilipenis* will key to couplet 59 in Stimpson, Klemm, and Hiltunen (1982), which I have modified as follows:



Figs. 1-11. *Limnodrilus tortilipenis*: 1, Anterior seta of VI; 2, Posterior chaeta of median segment; 3, Cuticular penis sheath of holotype; 4, 5, Distal ends of penes of holotype; 6-9, Distal ends of penes of paratypes; 10-11, Spermatozeugmata of holotype. Scale bars = 50  $\mu$ m.

- 59(58)a Head of penis sheath with overhanging hood and broad, flat proximal lip; distally, diameter of shaft flares into head; mature tube length 300 to 600  $\mu\text{m}$  .....  
..... *Limnodrilus hoffmeisteri*  
Claparède, 1862
- Head of penis sheath without overhanging hood ..... 59b
- 59b Shaft slender, long (600 to 700  $\mu\text{m}$ ), sigmoid, with head equilaterally triangular, hence bilaterally symmetrical .....  
..... *Limnodrilus claparedianus*  
Ratzel, 1869
- Shaft slender, extremely long (2700 to 4100  $\mu\text{m}$ ); distal end of head of penis corkscrew-like; proximal end of head with fingerlike projections, directed basally and medially ....  
..... *Limnodrilus tortilipenis*

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